

About the bibliometric analyses in Quality and Impact 2018, handbook for expert-reviewers

Role of bibliometric analyses in Quality and Impact 2018

Bibliometric analyses were compiled by the SLU library staff for each Unit of Assessment (UoA). The purpose of the analyses is twofold; to aid UoAs in the process of writing their self-assessment and to provide information to the expert panels on the UoA's scientific production and focus. The bibliometric analyses have been available to UoAs during their work with their self-assessments. This has given UoAs the possibility to provide further information about how the results of the analyses are related to their research strategy and to comment on various factors that may have influenced the outcome.

Choice of bibliometric indicators/analyses

The set of analyses was chosen in cooperation between the SLU Library and SLU management with consideration to recent developments within the field of bibliometrics^{1 2} as well as to be readily understandable and usable for the expert panels and UoAs. See the list of bibliometric analyses in Table 1 below. The analyses present a broad view of the UoAs' publication output regarding citation impact, collaboration and type as well as proportion of publication outputs other than peer-reviewed articles.

¹ Hicks, D., Wouters, P., Waltman, L., de Rijcke, S. & Rafols, I. (2015). Bibliometrics: The Leiden Manifesto for research metrics. *Nature* 520 (7548), 429-431. <https://www.nature.com/news/bibliometrics-the-leiden-manifesto-for-research-metrics-1.17351>

² Ludo Waltman (CWTS, Leiden) <https://www.cwts.nl/blog?article=n-q2w274>

Interpretation

On the Quality and Impact 2018 Digital Platform it is possible to compare analyses between different UoAs. As with all bibliometric analyses, it is important to note that the analyses are intended to be interpreted based on levels, not exact numbers. Several factors can influence the outcome of the analyses, for example composition of the UoA some years back.

Information about the indicators/analyses in relation to the UoAs

A list of the bibliometric analyses in Quality and Impact 2018 with regard to publication types, time period and specification of source, is found in Appendix A.

The bibliometric analyses are based upon the publications of individuals in each UoA. The UoAs include persons who were employed by SLU at least 50% during the month of May 2017. All PhD students and post-doctoral researchers are included regardless of how they are financed. In many UoAs technical staff is also included with regard to their important contributions to research.

Citation-based analyses

When an article is cited it is a sign that the published research has been used by other researchers and, hence is an indicator of scientific impact.

Metrics for the citation-based analyses are from InCites, which is a bibliometric tool provided by Clarivate Analytics and is based on data from Web of Science (for Quality and Impact 2018 analyses, they include Web of Science content indexed through 30 November 2017).

The citation-based analyses (percentile profile and % cited articles) do not include articles published the most recent years (2016 and 2017) since the time for citation is too short.

The metrics in InCites are calculated based on citations from the databases below.

Science Citation Index Expanded (SCI-EXPANDED)

Social Sciences Citation Index (SSCI)

Arts & Humanities Citation Index (A&HCI)

Conference Proceedings Citation Index- Science (CPCI-S)

Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH)

Book Citation Index– Science (BKCI-S)

Book Citation Index– Social Sciences & Humanities (BKCI-SSH)

The metrics in InCites includes self-citations and whole counting (not fractional counting³) is used.

For publications with co-authors from more than one UoA, these publications are included in the analyses for each UoA.

Table 1. Set of bibliometric analyses

Analyses based on peer-reviewed articles (incl. reviews)	Time period
Percentile profile (top 5%, top 10%, top 25%, top 50% most cited) % international co-published articles % cited articles	2009-2015
Number of articles (and share in Web of Science) per year	2012-2016
The most frequently used journals	2012-2016
Collaboration analysis - visualization of co-published articles showing national and international collaborating organizations Collaboration analysis - visualization of co-published articles showing collaborating departments within SLU	2012-2016
Analyses based on other types of publishing	Time period
Number of publications per year books, book chapters, reports (peer-reviewed + other scientific)	2012-2016
Number of popular science publications per year - Articles, books, book chapters, factsheets	2012-2016

³ If fractional counting is used, an example -
A publication has 4 authors and one of them belongs to the UoA. The UoA only gets credit for ¼ of the publication.

Percentile profile - The percentile profile gives an overview of how the UoAs publications are distributed regarding citation impact within its subject area. Percentile values are normalized, which means that a paper's total citation is compared to all papers with the same subject area, document type and year (baseline). The subject area for an article is determined by how the journal in question is classified. If a journal is assigned to more than one subject area, the percentile is based on the subject area in which the paper performs best. For journals that are classified as 'Multidisciplinary' and 'Medicine, General and Internal' the included articles are reclassified based on their reference list. Percentile profile (top 5%, top 10%, top 25%, top 50% most cited) presents the share of UoA's articles belonging to the different percentile rank classes.

% cited articles - percentage of articles that have been cited one or more times.

Collaboration analyses

% international co-published articles – percentage of articles that have at least two different countries among the affiliations of the co-authors. International collaboration gives more visibility of UoA's research. This indicator, together with visualization showing international collaborating organizations, gives a picture of the extent to which and the character of the UoA's research collaboration.

Collaboration analysis, external - visualization of co-published articles showing national and international collaborating organizations.

Collaboration analysis, internal - visualization of co-published articles showing collaborating departments within SLU.

For more information about the visualizations, see Appendix B, Information about visualization of co-published articles.

Types of publications, journals and productivity analyses

Number of articles in relation to the proportion in Web of Science per year – only articles published in a journal indexed by Web of Science are included in the citation-based analyses. When interpreting the citation-based analyses it is important to know the proportion of articles that are not included in these analyses. Journals indexed by Web of Science, have a certain measure of the status since the journals must meet a number of quality criteria set by the producer of Web of Science (Clarivate Analytics).

The most frequently used journals (about 10 journals) – gives a picture of where the UoAs research results are most frequently published. No journal indicator is used. Scientific experts on each panel have knowledge of relevant journals within the subject area of their own expertise and can assist the entire panel to judge the visibility/outreach of a journal if necessary. The articles of an UoA in high prestige journals may not appear in this list of the most used journals but such will most likely be mentioned in the UoA's self-assessment.

Number of publications per year - for publication types other than peer-reviewed articles. These analyses together with number of peer-reviewed articles give a broad view of the UoA's publication output, including popular science publications which mediate scientific information to the general public.

Notes – strengths and weaknesses

The origin for all analyses is SLU's publication database (SLUpub). Responsibility for registering publications in SLUpub lies continuously on researchers and their departments, which means that there could be some publications that are not registered.

The overall quality of data (used for Quality and Impact 2018 analyses) from SLUpub is high, all records are validated by the library. Although due to the multifaceted publishing landscape it is sometimes difficult to distinguish between publication types. However, before the analysis work started, the UoAs had the opportunity to work together with the library to verify the underlying publication data.

The co-publishing visualizations showing collaborating external organizations is based on address-data in Web of Science records. If an author has provided an incomplete organization name on their publication (as occasionally happens), then the publication is not included in the visualization as belonging to the organization in question.

'Percentile' is the most robust indicator for scientific impact, especially for relatively small publication sets. Percentile rank with threshold values (top X %), has not the inherent weakness of mean values (skewed distributions)⁴.

The productivity analyses show trends over time. The UoAs for this evaluation are formed of SLU employees that were employed at least 50% in the month of May

⁴ See page 228 in Bornmann, L., Further steps towards an ideal method of measuring citation performance: The avoidance of citation (ratio) averages in field-normalization. *Journal of Infometrics*, 5, 1 (2011), 228-230.
<https://doi.org/10.1016/j.joi.2010.10.009>

2017. Naturally, when going back for instance five years in time, the composition of the research group may look quite different (number of/activity time as researcher). UoAs will most likely commented on this in the self-assessment, if they deem it to be important.

On the Quality and Impact 2018 Digital Platform the bibliometric analyses are for the most part presented as charts. In the charts, a click on a column opens a list showing upon which publications that the column is based. For many of the publications in the publication list, there is a link to the article in full text or a link to the publication record in Web of Science. See Appendix C, Link information–publication/organization/department lists

Access to the publications that are the basis of the analysis gives transparency, panel members have opportunity to assess the quality and relevance of the article.

Appendix A

Bibliometric analyses in Quality and Impact 2018 with regard to publication types, time period and specification of source.

Analysis	Publication types	Time period	Source
Percentile profile (top 5%, top 10%, top 25%, top 50%)	Articles (peer-reviewed)	2009-2015	SLUpub->InCites - Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI)
% international co-published articles			
% cited articles			
Collaboration analysis - visualization of co-published articles showing national and international collaborating organizations	Articles (peer-reviewed)	2012-2016	SLUpub->Web of Science (WoS) - Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI)
Collaboration analysis - visualization of co-published articles showing collaborating departments within SLU			
Number of articles (and share in WoS) per year	Articles (peer-reviewed)	2012-2016	SLUpub, Web of Science (WoS) - Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI)
The most frequently used journals	Articles (peer-reviewed)	2012-2016	SLUpub
Number of publications per year	books, book chapters, reports (peer-reviewed+other scientific)	2012-2016	SLUpub
Number of popular science publications per year	Articles, books, book chapters, factsheets	2012-2016	SLUpub

Appendix B

Information about visualization of co-published articles

General

Organizations are indicated in the visualization by labels and circles. The size of a circle represents the number of publications for an organization. The stronger the link between organizations (number of co-published articles), the thicker the line.

A strong link between two organizations can be due to a person in the UoA having more than one affiliation (for example works at SLU as well as at another organization or works at two departments at SLU).

The visualizations are interactive in the sense that you can temporarily move the position of organizations (circles). You can also use 'mouse over', a feature that gives specified information which appears in the upper left hand corner of the visualization. If you place the mouse over a circle you will find the name of the organization, if you place the mouse over a link you will find information on the co-publishing organizations.

Articles with authors from only one organizations are not included in the co-publishing visualization but are included in the associated list of organizations.

External collaboration analysis

The visualizations have a default threshold of the top 25 organizations that have the most co-publications with the UoA. However, should there be several organizations with the same number of co-publications with the UoA, then these are also included. In the left hand corner you can find information about the actual number of organizations included.

At the top of the visualization you can change the number of displayed organizations by decrease or increase the threshold for number of co-publications. There are some limits to the technology and displaying more than 75-100 organizations may result in that parts of the visualization end up outside the display area.

You can also get a list of all organizations involved including information on the number of co-publications together with links to the publication records in Web of Science. With the help of the search/find feature in the web browser you can search for a certain organization, for example a non-academic organization, in the list.

In the visualizations blue circles are national organizations, turquoise circles are international organizations.

Data from Web of Science is used for the external collaboration visualizations. In this database organization name variants has been unified, by the producer of Web of Science, to a preferred name. In the analysis the preferred name for an organization is used if it exists, otherwise the name stated in the author address is used. In some cases the database producer has assigned more than one preferred name and those organizations may be represented in the visualization with more than one circle.

Name variants for an organization (as stated in author addresses) that can't be identified due to incomplete information are in most instances omitted.

SLU internal collaboration analysis

In this visualization all co-publishing among departments at SLU are displayed. At the top of the visualization you can get a list of all involved departments together with links to the publication records in the SLU publications database (SLUpub). Department names have their origin from the SLU Identity and Information System.

Possible organizational changes during the time period may result in that both old and present departments' names are shown in the visualization.

Appendix C.

Link information – publication/organization/department lists

Publication lists from charts

- **DOI** (Digital Object Identifier) – link to the article in full text
- **WOSID** (Web of Science record identifier) – link to the record in Web of Science
- **Epsilon** – link to the publication in the SLU Open Access archive

Organization/department lists from co-publishing visualizations

- **Organization lists** – links to the record in Web of Science
- **Department lists** - links to the record in the SLU publication database. In this record, links to the article in full text and the Web of Science record may be found.

To ensure access via the links DOI and WOSID, a VPN-login is recommended (allows access to resources subscribed by SLU). Information on how to get a VPN login for Windows and for Macintosh can be found on the Quality and Impact 2018 website https://internet.slu.se/Organisation-och-styrning/KoN2018_sv/ and among the documents on the digital platform under 'How to – Instructions'.